PAN-PACIFIC ENTOMOLOGIST
69(1): 111–113, (1993)

Scientific Note

THE FORMOSAN SUBTERRANEAN TERMITE, *COPTOTERMES FORMOSANUS* SHIRAKI (ISOPTERA: RHINOTERMITIDAE), ESTABLISHED IN CALIFORNIA

The Formosan subterranean termite, *Coptotermes formosanus* Shiraki, which has been introduced into subtropical, coastal areas throughout the world (including Hawaii, Louisiana, Alabama, Mississippi, Florida, Texas, and South Carolina), is native to mainland China. Although it is primarily known as a structural pest, it can be an agricultural pest because of its habit of consuming the heartwood of living trees (Su, N.-Y. & M. Tamashiro. 1987. pp. 3–14. *In* Tamashiro, M. & N.-Y. Su (eds.). Biology and control of the formosan subterranean termite. Hawaii Inst. Agric. Human Resources Research Extension Ser., 83). In the United States, it has become the major economic pest of structures in areas where it has been introduced because of its destructiveness and control problems. In mid-February 1992, a pest control operator in the San Diego area submitted a sample of several termite soldiers from a residential property in La Mesa at which he had experienced difficulty in achieving satisfactory control. The soldiers were identified as *Coptotermes* species by comparison with voucher material. Definitive identification was made by Dr. Rudolf Scheffrahn (University of Florida, Fort Lauderdale, Florida) on the basis of dried alates collected in the attic of the home at a later collected in the attic of the home at a later date.

We visited the site on 5 Mar 1992 to look for evidence of termite activity. The house (built in the late 1940s) is situated on a moist hillside in a former vegetable farm with abundant fruit trees. The property is heavily irrigated with a combination of drip and sprinkler systems. Numerous dead bodies of termite soldiers and workers were observed inside the house under the carpet along a previously treated wall. In the attic, we found many cadavers inside the eaves above the wall where termite activity had been noted. There had been no live termites or corpses in this area several weeks previously when the same area had been inspected by the pest control operator. The dead termites observed in the attic probably had died as a result of the chlorpyrifos treatment, either from direct intoxication or as a consequence of the termites inside the structure being cut off from the soil. We noted numerous shed wings of *Coptotermes* alates in the attic. These shed wings might have been overlooked during initial inspections or confused with those of drywood termites, which were known to occur there. Several intact, desiccated alates were found in spider webs.

Inspection of the property revealed *Coptotermes* activity in wood that was buried or in contact with the soil (steps, tree stumps, raised borders of beds, fences), planters made from oak barrels cut in half, and a raised wooden deck. Active termite foraging was observed up to the property lines on three sides of the property (the fourth side faces the street). The large numbers of workers and

soldiers, their large size, and the amount of damaged wood on the site were remarkable. We found no live termites inside the house or indications of active structural infestation on 5 Mar, indicating that contact between the termite colony and the structure had been broken. Live soldiers and workers were again noted on 28 Mar, suggesting that the termites had found an untreated access route to the wall. On that date, neighboring properties were inspected for evidence of Formosan subterranean termite activity. Live termites were found on a total of four adjacent properties, but not in others on either side of these.

Although *C. formosanus* has been intercepted in California on several occasions, this is the first case in which it has become established. The presence of wings in the structure indicates that there is at least one mature colony in the area, because alates are not produced by young colonies. A neighbor indicated that he had observed termite swarms in the early evening during the past several years. These were probably *C. formosanus* because native subterranean and drywood termite species typically swarm during daylight hours. Laboratory colonies have produced alates within 10 years, although it is believed that alates would be produced in less time (5–6 years) under field conditions (Su & Tamashiro 1987). The large size of the workers (4.27 ± 0.09 mg, average of five groups of 10 workers) and soldiers is typical of mature colonies, probably greater than 10 years old (Rudolf Scheffrahn, personal communication). We have no indication of how many colonies might be involved. The total area in which we observed live termites is within the foraging range of a single colony (the maximum distance between sites of observed activity across the four properties was approximately 100 m) (Su, N.-Y. & R. H. Scheffrahn. 1988. Sociobiology, 14: 353–359). Swarming alates may have established new colonies that were not detected in our preliminary surveys.

Because most introductions of the Formosan subterranean termite have been in seaports in tropical and subtropical areas of the world, regulatory attention has focused on port areas. The La Mesa infestation, however, is over 9.4 km (15 miles) inland. The source of the original colony may have been neighbors who moved into the area with all of their personal belongings in June of 1976 from an infested part of Hawaii. This scenario could easily be repeated with the extensive contacts between California and Hawaii and countries of the Pacific Rim. The possibility of overland introduction of colonies cannot be ruled out, as this termite is now well established in many areas of the southeastern United States. A mated pair of alates could be transported under conditions suitable for their survival and placed in an appropriate setting on arrival. This could be in potted plants, nursery material, outdoor furniture, among other possibilities. Although the climate of most parts of California is much drier than that of many areas where the Formosan subterranean termite has become established, properties that are heavily shaded and irrigated, such as the one at La Mesa, provide a suitable microhabitat for establishment and subsequent colony growth.

Material Examined.—CALIFORNIA. *SAN DIEGO Co.:* La Mesa, 5 Mar 1992, T. H. Atkinson, M. K. Rust & J. M. Smith.

Acknowledgment.—Mike Cole, Algon Exterminating, El Cajon, was the local pest control operator who first detected the problem. Steve Fleming, DowElanco, San Diego, submitted the first specimens for identification. David Kellum, San

Diego Co. Agricultural Commisioner's Office, obtained permission from neighboring homeowners for the follow-up survey on 28 Mar.

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Received 17 April 1992; accepted 17 September 1992.

Editorial Notice

Pan-Pacific Entomologist
Additions to the Editorial Staff

The editorial staff of the *Pan-Pacific Entomologist* has increased, with appointment of Dr. Robert V. Dowell as Associate Editor, effective with volume 69. The staff now includes: an Editor (John T. Sorensen), Associate Editor (Robert V. Dowell), Book Review Editor (Ronald E. Somerby) and Editorial Assistant (Susan M. Sawyer).

Although Dr. Dowell will handle non-taxonomic manuscripts, please continue to send *all correspondence and submissions* directly to the Editor for handling efficiency. This staff increase was necessitated by the State of California's 1993–94 budget restrictions, and resulting additions to the regular workload of its employees.